MODULE

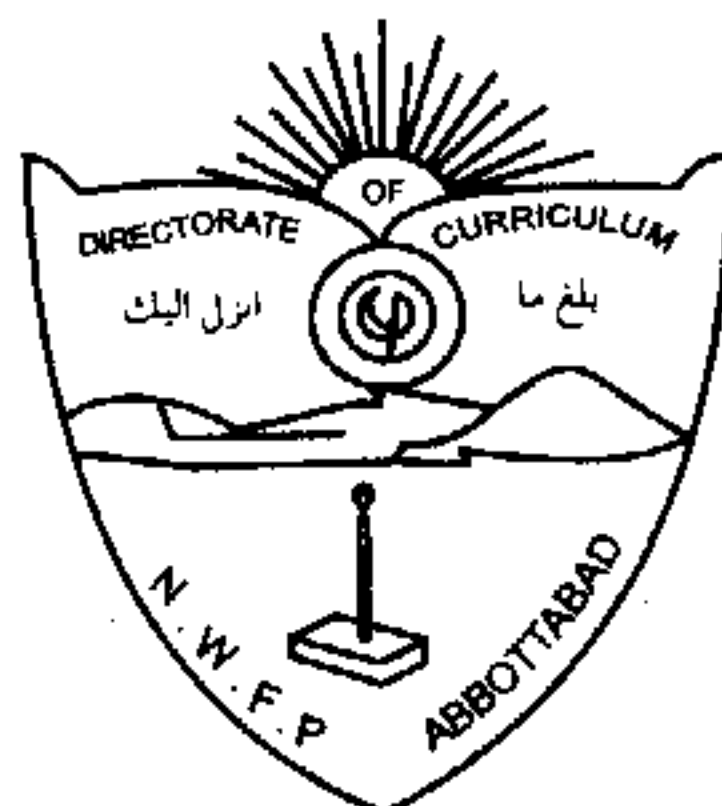
TEACHING OF ENGLISH FOR CLASSES XI-XII

S.S

FOR

TRAINERS/TEACHERS.

DIRECTORATE OF CURRICULUM &
TEACHER EDUCATION
NWFP ABBOTTABAD
JAN-FEB: 2003

MODULE

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Publisher	Directorate of Curriculum and Teacher Education NWFP Abbottabad.
Date of Publication	Jan - Feb, 2003
Printing	Govt: Printing Press NWFP Peshawar.

Errata for Teaching Module of English for SS

S.N	Page Number	Line Number	In-correct	Correct.
1	1	24	resources material	resources/material
2	1	25	have been made involved	have been involved
3	3	3	First year/secondary	First year/second year
4	3	15	4. a sentence 5. Two sentence, paragraph and composition	4. a sentence, two sentences, paragraph and composition
5	3	21	to day	today
6	5	2	topic, thoroughly	topic thoroughly
7	5	12	good intonation make correction if found	good intonation . Make correction if needed
8	6	13	parts	words
9	7	20	Province	Provinces.
10	7	35	work writing	work
11	8	2	Key	Key points
12	9	17	irdely	orderly
13	10	7	explanation	explaination
14	11	3	Write of	Write all.
15	11	13	What is meant by "the phrase the man in street"?	What is meant by the phrase, "the man in street"?
16	13	1	All	At
17	13	2	past indefinite	past indefinite
18	15	1	past habits	Past habits
19	15	2	habit	habits
20	17	3	rhythea	rhythm
21	17	22	Showed	Shows
22	17	22	living they	living. They
23	18	25	down	dawn
24	19	8	Parapharase the second	Pharapharase of the second
25	20	12	eve	ever
26	20	13	their	these
27	21	12	when soft	When soft
28	22	16	though	through
29	23	2	in	to

Directorate of Curriculum & Teacher Education, NWFP, Abbottabad is launching a comprehensive programme of in-service through out the province for all subjects/categories for the classes 6th to 12th under the title "Teacher Training Programme" scheme Improvement of Learning Environment For Quality Improvement for the year 2002-2004 as per policy of the Govt of NWFP, School & Literacy Department, Peshawar. The prime focus of this manual is training delivery effectively. There are two approaches to teacher's professional development, the carporate approach and the individual one, but in this guide book attempts are made to link the both practically.

To make the INSET Programme more effective and successful a "Survey Study" has been conducted to collect the feed back, needs of the learners, requirements of the teaching staff and desires of the concerned managers through, interview/questionnaires, survey form and classroom observation forms. Sample for the study was selected a few middle and secondary/Higher Secondary schools (Girls boys urban & rural).

The study was conducted by the Deputy Director (Training) and Subject Specialists of this Directorate.

In the light of above information & facts training strategy and instructional material has been developed to improve the learning environment for quality improvement through the innovative methodology and pedagogical techniques.

Instructional material consists on training manual for lead trainers & field trainers for delivery of training effectively and modules for each subject (VI – XII/Science/Arts) to facilitate the field Trainers as well as trainees of all categories (SS, SET (Science/Arts), CT, AT, TT).

The training manual comprises two parts, one for Subject Specialists training imparted by PITE and the other one for SET/CT/AT/TT training imparted by RITEs NWFP.

Umar Farooq
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INTRODUCTION.

English is an important international language. The knowledge of English throws open the prospects of employment at home and abroad. The latest statistics show that more than half of the world speaks English. With a view of enabling students to learn this important language in the manner that they may develop skills of listening, speaking, reading and writing as a means of communication, Government has made efforts to facilitate the teaching and learning of English. However, contrary to the importance given to this language, the public examination results, show a decline in the hearing of English Language. We realize that if English Language teaching is neglected then this decline in the students output will be inevitable .

In view of this reality the Govt:has been improving the conditions faced by the teachers and students of English by offering module which provides a basic outlines of the practical approaches and techniques which a teacher of English needs to apply in the classroom.

The contents of this module have been taken from the hard areas found in study conducted by Directorate of Curriculum and Teacher Education NWFP. These contents are:-

1. Writing a composition (My Country)
2. Paragraph writing
3. Teaching of Prose (Science and Scientists)
4. Teaching of Grammar (Past Indefinite Tense)
5. Teaching of Poetry (Lucy Gray)
6. Teaching of Poetry (Music When Soft Voices Die)

In all these above contents the activities are designed keeping in view the limitation of teachers i.e. financial, skills and time. Most of these activities are designed with the use of easily available resources material.

The learners have been made involved in the learning process from the very beginning. Sometime involving the student in the learning process through their personal experiences, sometime through the discussion of students in groups.

In all these activities the logical sequence of the activities is maintained but without traditional steps of lesson planning. In all these activities the work of the teachers is minimized. His role is just of a facilitator and guide. Most of the work is done by the learners.

In short it can be said that innovation has been made but the need for the further improvement is always there. It is expected that the trainers, keeping in mind the objectives of any content will make some further improventant and their suggestions in this regard are welcomed.

Lesson plan for paragraph writing.

Subject. English
Class First year/Secondary.

Time one hour

Topic:- A Paragraph Writing

Objectives:-The Students will be able to

I. Discuss the given topic thoroughly and write sentences on the topic from their own side.

II. Give order and sequence to the sentences by finding a proper relation in them.
III. Reproduce their informations, in a logical and clear way.

Required Material:-

1. Writing Board
2. Photocopies of model paragraph
3. Cards of Students for activity No.2
4. Charts having written a sentence
5. Two sentences, paragraph & a composition.

Activity No. 1

10 Minutes

I. Arrange the class into groups.
II. Paste charts on the blackboard having written on, a sentence, two sentences, one paragraph, one composition with three to four paras.
III. Ask the students what they look on the blackboard.
IV. Guide their responses and announce that to day we will learn how to develop a paragraph.
V. Write of few sentences on the blackboard in the shape of a paragraph.
VI. Discuss, elaborate and guide.

Activity No.2. Time:- 20 min

I Distribute papers among the groups having written the following sentences.

- I was given a headphone for my ears.
- We were asked to fasten seat belt.
- The airhostess directed me to my seat.
- We were given instructions and advice to meet emergencies.
- We were welcomed by the pilot and the crew on microphone.

II. Tell the students/groups to discuss the sentences in-groups and find links and relation in them.

III. Monitor, guide and support the groups.

IV. Ask the group leader to present their work.

V. Discuss, elaborate and elicit the paragraph.

First I was directed by the airhostess to my seat. We were welcomed by the pilot and the crew on microphone. I was given a headphone for my ears. We were asked to fasten the belt. We were given instructions and advice to meet emergency.

Activity No.3.

20 minunt

I. Distribute cards among the groups written on with the topic "Museum".

II. Ask the groups to discuss the topic, thoroughly. Ask them to write each group five sentences on the topic.

III. Monitor, guide and support the groups.

IV Tell the groups to come turn by turn at the front and present their sentences.

- Write all the sentence on the blackboard.
- Discuss the sentences of all the groups with the class and find logical order in them
- With the Consensus of the class give number(order)to the sentences i.e 1,2,,etc.
- Write these sentences in a paragraph with the help of students.

V Read out the paragraph with good Intonation make corrections if found.

VI Repeat and elicit procedure of how to develop a paragraph from the Class.

Evaluation activity.

Time:-10 min

I Tell the groups

- Write the steps of writing a paragraph in order
- Select a topic of their own choice and write on it a paragraph of about ten sentences.

II Check the groups work and make correction with the help of the participants.

Content Writing a Composition

Concept: **(My Country)**

Time **40 Minuet**

Objectives.

All the end of the lesson the students will be able to:-

1. Write an out line for the composition
2. Discuss the Composition in light of the outlines.
3. Communicate their ideas, expressions and experiences.
4. Develop paragraphing skill

Material Required:

- Map of Pakistan
- Picture of Some Village/Rivers/ mountains / Air Ports/ Sea Ports etc.
- Charts with key ports.

METHODOLOGY.

Activity I **(Time 2 minutes)**

1. Write the topic " My Country" on the blackboard.
2. Ask the students to think about the topic for five minutes.
3. Ask them to write key points about the topic during this time.
4. Invite students to tell the key points.
5. Write all the key point on the blackboard.
6. Discuss the key points with students orally.

Activity-2 **(20 Minutes)**

1. Paste the chart with key point on the blackboard.
   Key points are:-

(a) (I.). Name of the country Islamic Republic of Pakistan.
(ii). Name of the continent:- Asia
(iii). Neighboring countries.

East................India
North West........Afghanistan
North East.........China
West................ Iran
South................ Arabian See.

(B) Historical background.
(i) Founder.........Quaid-e-Azam Muhammad Ali Jinnah
(ii) Thinker......... Dr. Allama Muhammad Iqbal
(iii) Province........ Punjab, Baluchistan, Sind, NWFP & AJK.
(iv) Big Cities...... Karachi, Lahore, Quatta, Peshawar.

© People, Culture, Religion
People........ Muslim Majority.
Culture........Farmers 75% Folk Dress, Folk Dances, Folk Songs.
Religion......... Islam

(d) Crop, Products, Industries.
Major Crops......... Wheat, Maize, Cotton,
Products.............. Regional Handicrafts, Leather Garments, Textile Goods.
Industry............... Cotton, Sports, Leathers, Cattle Raising.
Note:- Here use map of Pakistan for its geographical position

2. Divide the Students into groups.
3. Ask them to work in groups and elaborate these key points.
4. Monitor and facilitate.
5. Ensure the individual work writing
6. Invite a few members of the group to read elaborated points before the class.

Activity 3 **(10 minutes)**

1. Write an other topic on the blackboard e.g " My Self"

2. Ask the students to prepare the key on this topic and write down on their note books c.g Family, Background, Present Status, Education, likes and dislikes, Characteristics, Short comings, Desires etc,

3. Invite two or three students for their presentations.

4. Assign a task to them to write an essay on " My Self " as home assignments.

CONTENT: HOW TO TEACH A PROSE EFFECTIVELY.
CONCEPT SCIENCE AND SCIENTISTS.

OBJECTIVES.

At the end of the lesson students will be able to:-

1. Comprehend the lesson
2. Make difference between scientific and unscientific approach.
3. Do the exercise conveniently given at the end of the lesson.

Material Required.

1. Textbook, Blackboard,
2. Chalk,
3. Duster,
4. Flash Cards.

Content (Knowledge)

Science is defined as the collection of facts expressed in exact and clear term in a manner that truth of any one of its rules can be tested. All its rules or laws express the connection between these facts. Science is more related with its practicability i.e it is the practical side of it. The common man does not have a clear idea about the science subject. He considers that only Physics, Chemistry, and Biology are science subjects which he does not include Mathematics E[illegible]enring in science subject.

Scientist are more interested in doing scientific work than in defining it. Scientific work is as exact as possible, irderly arranged and based on sound and sufficient evidence. The basic aim of science is to find out the truth. This sort of knowledge is free from prejudice and odd beliefs. It is an impartial study.

In nut shell it can be said that science is every kind of knowledge which is exact and is expressed in clear language is called science. It helps in advancing knowledge systematically and regularly on the basis of experiments

METHODOLOGY

Activity I

1. Ask the students to think about the work of a scientist and an uneducated man for three minutes.
2. Invite a few students to tell the class the difference between their works.
3. Announce the topic " Science and Scientist " after receiving the replies from them.
4. Write the topic on the blackboard.
5. Briefly explain the lesson to the class.
6. Use in your sentences all the difficult words during the explanation and write the key words on the blackboard.

Activity 2

1. Read the lesson with correct pronunciation and good intonation.
2. Ask two or three students to read.
3. Write all the mispronounced words on the blackboard and correct these with the help of students.
4. Ask the students to underline the difficult words.
5. Ask them to guess meaning and discuss these in pairs.
6. Explain the meaning of difficult words on blackboard using different techniques i.e through antonyms, synonyms or use in sentences e.g

   Unambiguous : Clear, visible
   Conclusion : Result
   Random : Quickly Not thoroughly
7. Translate the passage into Urdu but don't translate yourself. Throw the sentences towards students for translation. Encourage them to translate in idiomatic Urdu.

Activity 3

1. Divide the students into groups.
2. Ask them to underline all the important points of the lesson.
3. Direct them to write of these points in their Note Books.
4. Monitor, facilitate and even help them if needed.
5. Invite a few members of the groups to read the summary before the class one by one.
6. Make corrections in the sentences if present with encouraging spirit

Activity 4

1. Divide the class into three groups
2. Assign different tasks to each group.

Group-I

Ask this group to write all the verbs in first two paragraphs and write their nouns.

Group-II

Ask this group to write the answer of the following questions on the flash cards.

1. What is meant by "the phrase the man in the street "?
2. What is meant by "Jumping to conclusions"?
3. What is the meaning of "Unambiguous"?

Group III

Ask this group to underline all the nouns present in the lesson.

4. Now invite a member from each group to read the work of their group
5. Discuss the work of each group with the class.
6. Summaries each group's work.

Self Assessment

Ask the following questions for the evaluations.

(i) What is the first form of 'hunted'

(ii) What is the noun of " define"?

(iii) Use the word" sufficient" in the sentence?

(iv) What is the meaning of 'unabigrious'?

(v) What is the meaning of 'facts'?

CONCEPT Teaching of Grammar.

Concept: **Past Indefinite Tense.**

Level: **Intermediate**
Time: **I hour.**

Objectives.

All the end of lesson, students will be able to:-

1. Tell the different uses of past indefinite Tense
2. Narrate the structure of the sentence.
3. Use the tense in their practical lives.

Material Required

1. Chart
2. Blackboard
3. Chalks
4. Duster

Activity I:

1. Ask the student to think about their activities of yesterday.
2. Invite two or three students to narrate their activities of yesterday. Ignore the mistakes of students for the time being.
3. Narrate himself your activities of yesterday.
4. Write some of the key words on the one side of the blackboard e.g.
   Got up, offered Fajr Prayer, recited the Holy Quran, had breakfast reached the schools in time attended the school assembly............ Etc.
5. Repeat and try to write the sentence on the blackboard e.g

   I got up early in the morning I went to mosque. I had a bath and offered Fajr Prayer. Then I recited the Holy Quran. I had breakfast at 7.30 AM. I went to school.

6. Elicit the structure of these sentences with the help of students i.e

Sub + V-ed + O
(Past)

7. Then show the chart of negative and interrogative sentences;-

I did not get up early in the morning.,

I did not smoke.

I did not reach the school in time.

Did you go to bazaar yesterday.

Did he write a letter?

8. Again elicit the structure of negative and interrogative sentences of Past Indefinite Tense. i.e

S + did not (didn't) + V (Present form) + O
And

Did + S + V (Present form) + O

9. Divide the students into different groups.

10. Ask them to write their activities of yesterday (at least ten sentences) and negative of these sentences.

11. Invite a few group leaders to read their sentences before the class.

12. Make the correction if needed

Activity 2

1. Tell the students the use of Past Indefinite Tense for the Past habits.
2. Narrate some of your past habit to the class.

   I smoked: I played hockey in the evening.
3. Write the keys words of these sentences e.g

   Played hockey, Smoked, talked too much etc.
4. Divide the students into pairs.
5. Ask them to write at least their five past habits.
6. Invite a few students to present their sentences before the class.

Write the sentences on the blackboard and discuss the structure of the sentences.

Activity 3

1. Paste the chart of written sentences and read the sentences.

   He always carried an Umbrella.
   He never Came on time
   He always spoke loudly.
   We went to Murree in every summer
   He always stood first in the class.
2. Divide the students into groups of Past Indefinite Tense.
3. Ask them to think about this use of Past Indefinite Tense
4. Facilitate and supervise the work of students.
5. Elicit the use of this tense for the repeated actions from the students.
6. Summaries this use.

Self Assessment.

1. Distribute the flast cards among the students and ask them to write the different uses of this tense.

2. Distribute the cards of written sentences having mistakes in the structure.

   1. I go to bazar yesterday
   2. I did not wrote a letter
   3. He did not stood first in the class.
   4. the structure of the sentence for Past Indefinite tense is

      S + V (Present form) + O

Home Assignment.

Ask the student to write a paragraph about the achievements of Quaid-e-Azam.

CONTENT:- TOPIC TEACHING POETRY.

Concept:- **LUCY GRAY**

Objectives:-

At the end of the lesson student will be able to:-

1. read the poem with required pronunciation and good intonation.
2. enjoy the poem by giving attention to rhyme and rhythea.
3. write paraphrase of the lines/stanza.
4. narrate the story of the poem.

Material Required:-

1. Textbook,
2. Black/White board
3. chalks and duster
4. A chart of written stanza
5. Flashcard

Methodology:-

Activity 1:-

1. Ask the students to think about a person, who was very dear to them and he is not alive, for two minutes.
2. Invite a few students to introduce the person and the reason of their love and respect for him/her.
3. Tell the students about the love of poet for " Lucy Gray " and narrate the story.

Lucy Gray was small pretty girl. She lived with her parents on the moor. One day h r father sent her with a lantern to show the way to her mother, on her return from the town. She expected the storm and went toward the town. The storm came before its expected time and Lucy Gray lost her way. Her mother reached home safely but Lucy Gray could never return home. Her parents searched her but in vain. In the morning they found her foot-prints near a wooden bridge. These foot-prints were not present a head. This should that she had fallen into the stream, and thus she had lost her life.

Th re are still some people who believe that Lucy Gray is still living they tell us that they hav often seen her walking on the moors, singing a solitary song.

Activity 2

1. Read the first three stanzas written on the chart with correct pronunciation and good intonation. While the students are listening without the opening of their books.

   Oft I had heard of Lucy Gray
   And, when I cross'd the wild
   I chanced to see at break of day
   The solitary child.

   No mate, no comrade Lucy knew,
   She dwelt on a wide moor,
   The sweetest thing that ever grew
   Beside a human door!

   You yet may spy the fawn at play,
   The hare upon the green;
   But the sweet face of Lucy Gray
   Will never more be seen.

2. Then again read these stanzas of the poem and make two or three students read.
3. Write the mispronounced words on the blackboard.
4. Make the correction with the help of other students.
5. Ask the students to underline the difficult word e.g.
   Cross'd , At brake of day, dwelt, fawn, etc.

6. Ask the students to work in pairs and ask the meaning of difficult words from each other they don't know, then guess their meanings.
7. Explain the difficult words on the blackboard e.g.

   Oft.......................... Often
   The wild..................... Jungle, forest
   At break of day........... early in the morning, down
   Solitary..................... Lonely
   Companion.................. Fellow
   Comrade..................... Mate
   Dwelt........................ Lived
   Moor.......................... Area which is not used for farming
   Spy........................... See
   Fawn.......................... The young one of the dear.
   At play........................ Playing.

Activity 3

1. Read the first stanza of the poem.

2. Invite the students to make the paraphrase of this stanza.

3. Give the open choice to students to tell first. Encourage them while someone is paraphrasing. Don't point out the mistakes.

4. Paraphrase himself e.g.

   " He had often heard of Lucy Gray while passing through the jungle. He had a chance to see that lonely girl early in the morning. "

5. Make the paraphrase the second and third stanza of the poem with the help of students.

   The expected paraphrase of these two stanza is;

1. Lucy Gray had no mate and companion. She lived with her parents on a wide moor. She was the most beautiful child that was ever born in any human family.

2. She was as happy as young one of deer. She was skipping and jumping happily. She was happy as a hare playing on green grass. But his beautiful face could not be seen any more. She is not alive.

Activity 4

1. Paste the chart of the following written words on the blackboard:-
   Wild, day, night, thing.

2. Ask the students to discuss the rhyming words for these for five minutes while working in pairs.

3. Invite different students to tell their words.

4. Write all the rhymed word, for these on blackboard.

5. Instruct the students to read those words which are not read.

Activity 5

1. Write the line

   " Oft I had Heard of .... "
   On the blackboard.

2. Divide them into groups

3. Ask them to develop a stanza with their imaginations.

4. Make arrangement to write all the stanzas on single chart.

5. Display this chart in the class for some days.

Self Assessment.

1. Distribute the cards with written questions among the students.

   a. Who had heard about Lucy Gray?

   b. How many friends did Lucy have?

   c. Where did Lucy Gray live?

   d. Who was the most beautiful child eve born in any human family ?

2. Ask the student to read the answer of their question.

CONTENT: TEACHING POETRY

CONCEPT:- (MUSIC WHEN SOFT VOICES DIE)

Specific Objectives.

At the end of the lesson students will be able to:-

1. Recite the poem with proper stress, un-stress and gesture?
2. Appreciate and enjoy the poem while giving attention to rhyme scheme and rhythm.
3. Narrate the poem into their own words.
4. Tell the figurative language of the poem properly.

Material Required.

1. Picture of flowers
2. Textbook,
3. Blackboard
4. Chalk
5. Duster
6. Chart of written lines.

Content

Music when soft Voice Die is short poem of P.B. Shelley. In this poem he presents the idea of the immortality of beauty. He has written this poem for expressing his pure love for his beloved which is everlasting. He proves his statement through different examples. He tells us that just as good piece of music remains in our memory long after it has been heard. Similarly the perfume of violets too remains in our senses long after these are faded or dead. He also supports his view by saying that these faded and dead leaves are not useless. These are used to decorate the beds of beloveds. In similar way the poet hopes to love and enjoy the memory of his beloved, even after his death.

Methodology

Activity 1

1. Ask from the students the following questions.

   i. What are the effects of good music?
   ii. Why do we like flowers?
   iii. What are uses of leaves of flowers?

2. After having the answers of the question
   Tell the students about the poem " Music When Soft Voice Die" they are studying.
3. Narrate the summary of the poem to the class.

Activity 2

1. Read the poem with correct pronunciation and good intonation.
2. While reading poem, stress and unstressed of words must be kept in mind!
3. Read aloud again while instruct the students to look at the poem.
4. Make two or three students read the poem.
5. Write all the mispronounced words on the blackboard after their reading.
6. Correct the pronunciation of these words with the help of students.
7. Ask the students to highlight the difficult words of the poem. Encourage them to ask and guess the meaning while working in pairs.
8. Explain these words on blackboard with different techniques i.e though antonyms synonyms and use in sentences e.g.

   Soft Voice ...... music
   Die............... fade, wither
   Vibrates......... resounds, echo
   Odours.......... Fragrance, smell, scent.
   Quicken.......... To make quick or sharp
   Sicken........... die
   Is dead........... fades away
   Thy................ Your

Activity 3

1. Read the first stanza of the poem and ask the students to paraphrase this stanza.

2. Encourage the students in paraphrase; ignore all the mistakes of the students at this level.

3. Then paraphrase the stanza 1 and 2.

   1. The soft voices of music remain in our memory even when they have died. In a similar way the smell of violets lives in our senses even they have faded. Every beautiful thing leaves a lasting effect on our senses and memory.

   2. Leaves of rose are used to decorate the beds of beautiful ladies. These leaves do not go waste. In a similar way, your memories will be in my mind I'll enjoy with your thoughts when you are not with me.

4. Now explain these stanza with reference to the context.

Activity 4

1. Make the groups of the students.

2. Ask them to point out the figures of speech in the poet.

3. Direct them to discuss the use of these word among themselves.

4. Invite a few students to read these words and their sense to the class.

5. Summaries the use of these words.

Self Assessment.

A.

1. Divide the students into two groups i.e A and B
2. Ask the group 'A" to write the paraphrase of 1st stanza and group 'B" to write the paraphrase of 2nd stanza.
3. Invite a few member of each group to read the paraphrase.

B. Distribute the flash cards with written questions, and ask them to write their answer.

1. What is the effect of soft music on us?
2. Why are rose leaves not useless?
3. How can poet enjoy himself when his friend is not with him?

Summary/Important Point: - At the end summarize your activities in the following points.

- Mole is the SI unit of Amount of Substance.
- Atomic Mass, Molecular Mass Formula Mass of substances when expressed in grams is known as mole.
- The SI definition of the Mole is the amount of a substance that contains as many entities as there are in exactly 12 gm of carbon-12.
- One mole of anything always contains $6.02x10^{23}$ units of that substance.
- Mole is a number as well as a quantity.
- No of moles can be determined by:

$$\text{No of Moles} = \frac{\text{Mass in Grams}}{\text{Atomic Mass/Molecular Mass/formula Mass}}$$

Assessment/Evaluation: -

Q No.1. Fill in the blanks.

1. The SI Unit of amount of a substance is ______________
2. One mole of a substance contains _________ particles of that substance.
3. One Mole of ___________ weighs 12 gm.

Q No.2. Briefly describe.

(i). Mole (ii) Avogadro's Number (iii) Importance of Mole.

Q. No.3. Calculate the No. of moles in each of the following.

(i) 32 gm of S (ii) 67 gm of O_2
(ii) 47.9 gm of Nacl (iv) 0.03 gms of H_2

LESSON NO.3

Concept: - REAL GASES AND THEIR DEVIATION FROM IDEAL BEHAVIOUR.

2. Specific Objectives: At the end of this lesson the students will be able to: -

2.1 (a) Differentiate clearly between ideal and real gases.
2.1 (b) Differentiate clearly between Ideal and Non-Ideal gas behaviours.
2.1 (c) Clarify the causes of Non-Ideality of Real gases.
2.1 (d) Know the art of Graph construction.

3. MATERIALS REQUIRED.

1. Black Board
2. Chalk
3. Charts to show the graphs of real gas behaviours
4. Graph papers
5. Pencil
6. Eraser
7. Ruler

4. CONTENTS.

4.1 IDEAL AND REAL GASES: -

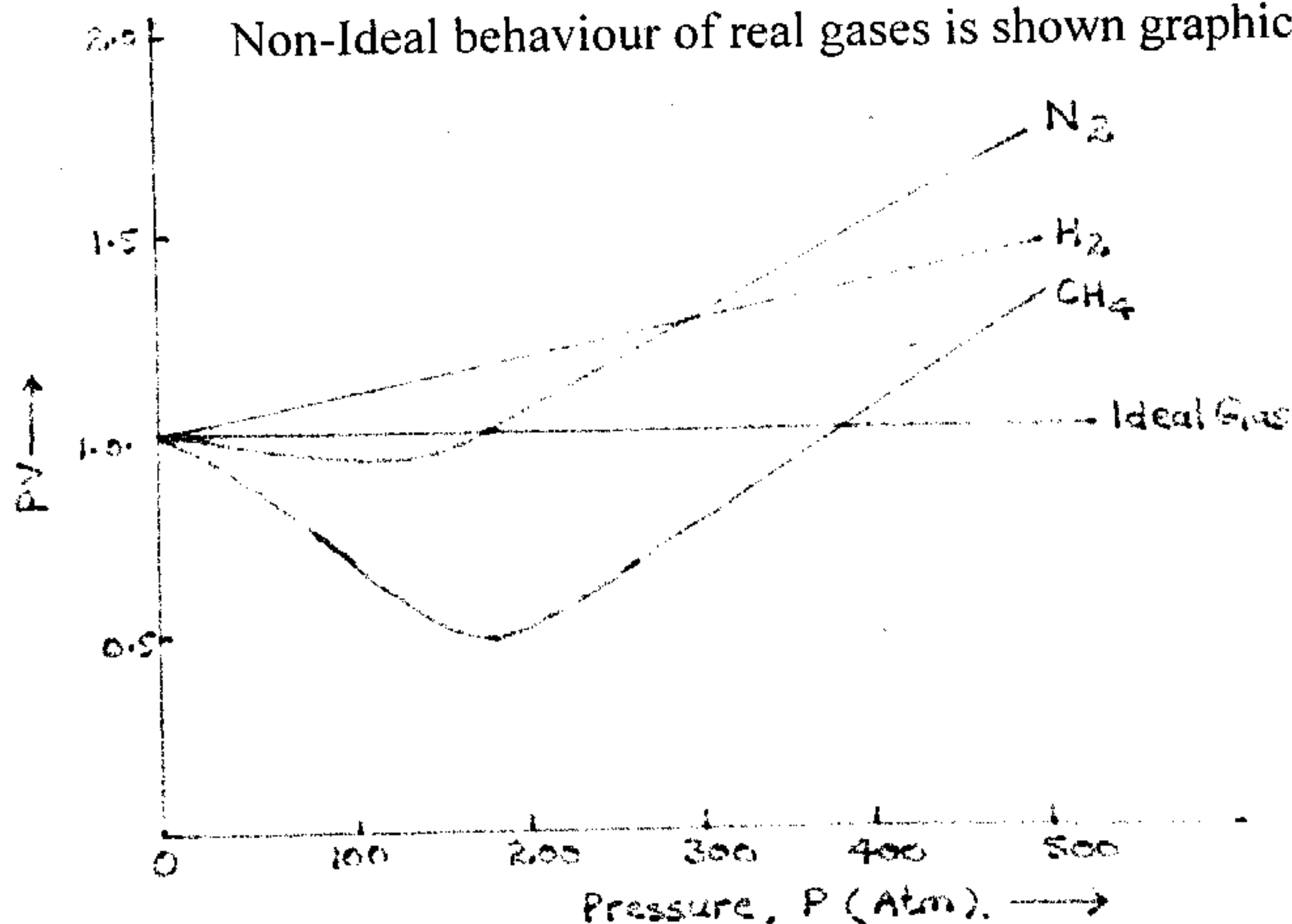
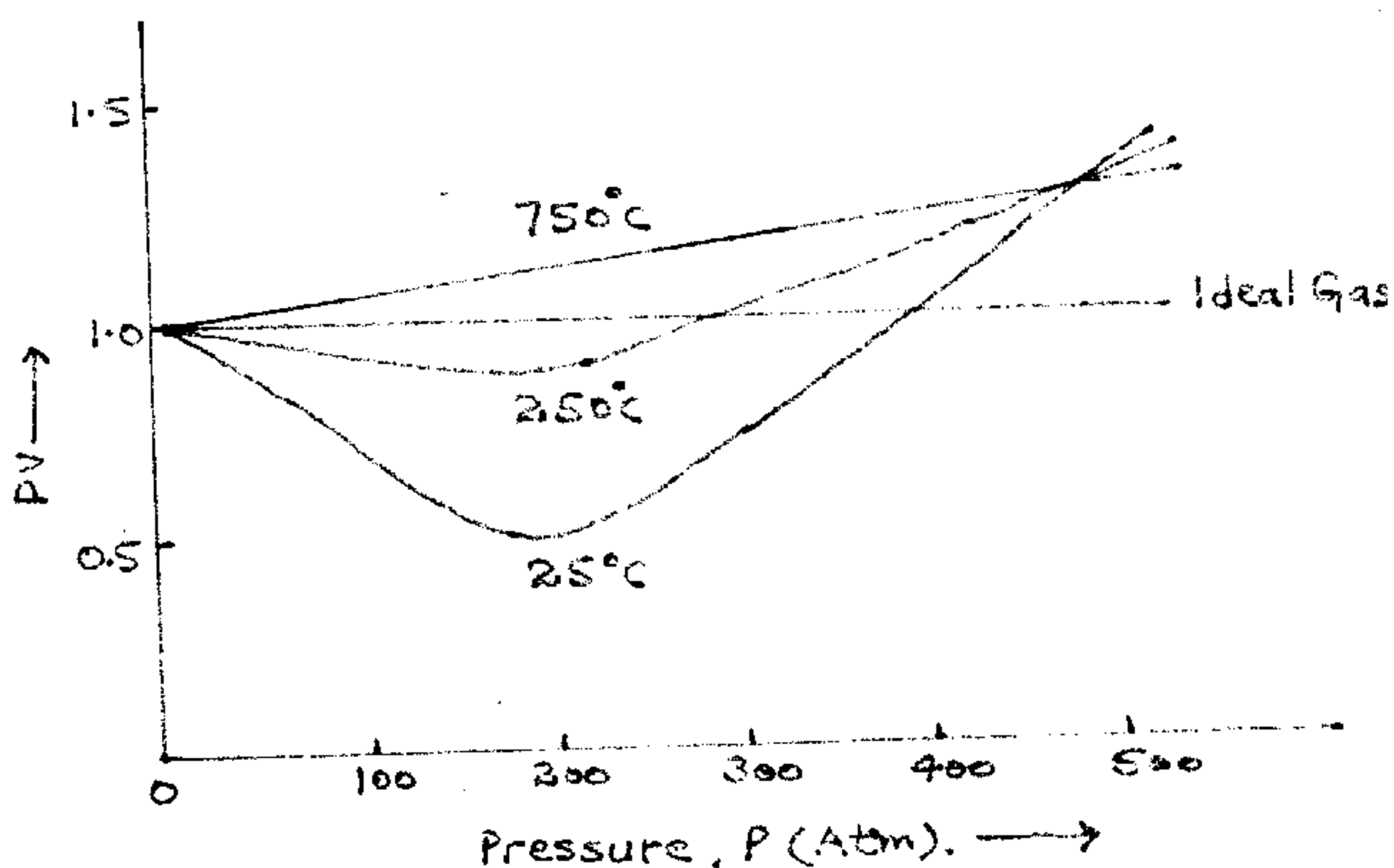
An Ideal gas is the one, which obeys gas laws at all conditions of pressure and temperature. OR which obey all the postulates of Kinetic Molecular theory. There is no Ideal gas in the universe. True or real gases, may behave Ideally at some conditions.

Real gases are those which do not obey the gas laws at all conditions of temperature and pressure OR which do not obey all the postulates of Kinetic Molecular theory. Examples of real gases are N_2, O_2 , H_2 , Cl_2 ,CO_2 ,SO_2 etc.

4.2 IDEAL AND NON-IDEAL GAS BEHAVIOUR: -

When a gas obeys any of the gas law, its behaviour will be Ideal. The gas behaviour can be studied graphically. e.g. if the graph of P against PV product for any gas is exactly according to Boyle's Law graph, the behaviour of the gas will be Ideal.

If the behaviour of a gas is not according to the gas laws, then it is Non-Ideal behaviour.

It has been observed that real gases like H_2, He, CO, N_2, SO_2 CH_4 etc show Non-Ideal behaviour. This Non-Ideal behaviour is more prominent at low temperature and High pressure. Even at similar conditions, the behaviour of different gases is different. The Non-Ideal behaviour of real gases is shown graphically: -

CAUSES OF NON-IDEALITY: -

Non-Ideal behaviour of real gas is due to 2 wrong postulates in K.M.T. These are; -

4.3 (i) The volume of gas particles is negligebally small as compared to total volume of the gas container.

4.3 (ii) There are no attractive forces between the gas particles.

4.4 REASONS OF NON-IDEAL BEHAVIOUR: -

The real gases show non-ideal behaviour due to the following reasons.

4.4 (i) At low temperatures, Kinetic energies of gas molecules decrease, their motions become slower and these come closer to each other. In other words, the attractive forces between them increase. In such a situation, we cannot say that there are no attractive forces between them. When the attractive force increase, it will lead, naturally to decrease of volume. With the decrease of volume at the same external pressure the pressure volume (PV) product is disturbed which leads to non ideal behaviour and thus a different graph pattern is observed.

4.4(ii) At very high external pressure, the gas particles come closer to each other, the Kinetic energies of molecule decrease and the intermolecular spaces reduce. This again leads to decrease of volume and disturbance of Pressure Volume (PV) product. At high pressure the attractive forces between gas particles and therefore the volume occupied by them become a significant factor. This leads to non-Ideal behaviour and a graph of different pattern from the original Boyle's Law graph is obtained.

4.4(iii) Even at similar conditions of pressure and temperature, the graph patterns are different for different gases. For non- polar gases like H_2 , O_2 , N_2 etc the deviations are not so prominent and their graph patterns are closer to the ideal gas behaviour (Boyle's Law). For Polar gases such as CO_2 . SO_2. NH_3 etc. , the deviations are more prominent. This is due to the fact that such gases behave like permanent dipoles due to which the attractive forces in them will be

operating at all the condition of pressure and temperature. With the increase of pressure and decrease of temperature, when molecules come more closer these forces become more stronger and therefore greater deviations are observed at these conditions.

METHODOLOGY: -

ACTIVITY NO.1: -

At the start of lesson ask the following types of question for brainstorming.

1.Can I ask the names of few gases?

Expected Ans: Oxygen, Hydrogen, CO_2

2. Do you know Boyle's Law?
   Expected Ans: Volume inversely proportional to pressure at constant temperature.
3. Who can draw an outline of Boyle's law graph?
   Expected Ans: Yes , a straight line graph.
4. Why a straight line graph is observed for PV against P?
   Expected Ans: Nil

Based upon the last question, you explain.

1. Ideal gases
2. Non ideal gases

Activity No.2

(Ideal and Non-Ideal gas behaviours)

1. Past the chart (teacher's constructed) showing ideal & real gas behaviors at different condition of pressure and temperature.
2. Explain the concept of Ideal and Non-Ideal gas behavior with the help of chart.

Activity No.3 (construction of graph)

1. Divide the students in Groups as required.
2. Distribute various materials like pencils, Eraser, ruler, Graph papers etc to the groups.
3. Distribute different written values among the Groups for PV Products, & Pressure P of different gases.
4. Ask the groups to construct the graph from given values accordingly.
5. Elaborate the Non-Ideal behaviour of Real gases from the Graphs.
6. Ask the reasons of variations.

Activity No.4: -

Based upon the last question of Activity No.3,
Explain the following concepts for further clarity: -

1. Causes of Non-Ideal behaviour i.e. two incorrect postulates of kinetic molecular theory.
2. Reasons of Non-Ideal behaviour -3 Reasons as given in the content under the heading "Reasons of Non-Ideal behaviour".
3. Write down the important points on black board and discuss with students.

Important Points/Summary.

- Ideal gases obey gas laws at all conditions.
- Real gases do not obey gas laws at all conditions.
- When a gas obeys gas laws, its behaviour is ideal.
- Real gases behave non ideally, especially at high-pressure and low temprature.
- The forces of attraction is polar molecules are very strong.
- According to KMT, the volume of gas particles is neglegible and no attractive forces operate among gas molecules.
- At low temprature, the forces of attraction in gas particles are very strong.
- At high pressure, the intermolecular spaces are reduced.

ASSESSMENT: -

Q.No.1 Briefly describe the following: -

1. Ideal gas
2. Non-Ideals or Real Gas.
3. Ideal gas behaviour
4. Names of 3 Non-polar gases
5. Polar Molecules.

Q.No.2. Pick out true and False from the following

1. According to KMT, there are very strong forces of attraction between gas molecules.
2. SO_2 is a non-polar Molecule.
3. Real gas deviate from Ideal behaviour at low temperature.
4. At high temperature, the forces of attraction between gas particles are strong.
5. The volume decreases with decrease of pressure.

Q.No.3 a. Why real gases show a non-ideal behaviour ?
b. Also explain the reasons of non-ideality.

LESSON NO.4

Concept: Crystal and Crystal Systems.

1 Objectives: At the end of this lesson, the students will be able to:

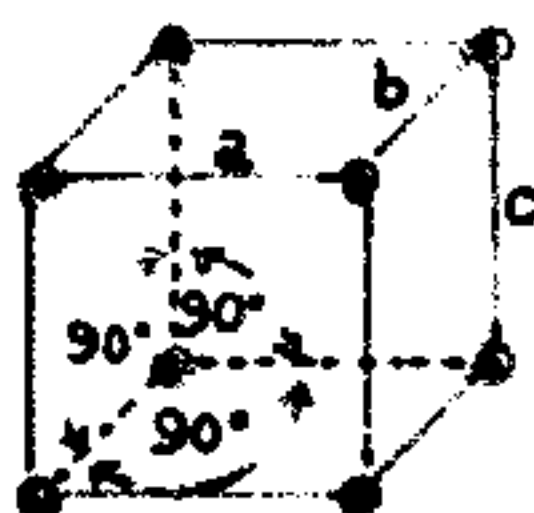
(i). Define a crystal.
(ii). Tell the meaning of crystal system.
(iii). Explain the various crystal systems.

2 Support Materials:

(i). Black Board.
(ii). Chalk.
(iii). Thumb pins or Adhesive Tape.
(iv). Two teachers made charts
- one showing a simple cubic crystal of Nacl.
- 2nd showing 7 different crystal systems and their proper examples.

(v). 2 Sets of play cards
- one showing different 3 dimensional diagrams.
- 2nd sets showing 7 crystal systems, one on each, on the basis of lengths and angles.

3. Contents/ Sub-Matter:

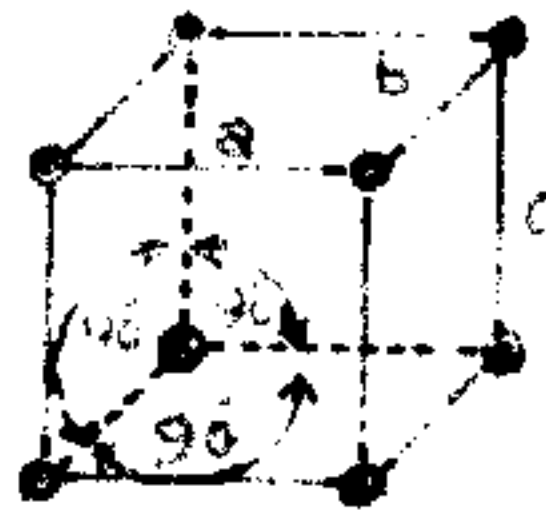
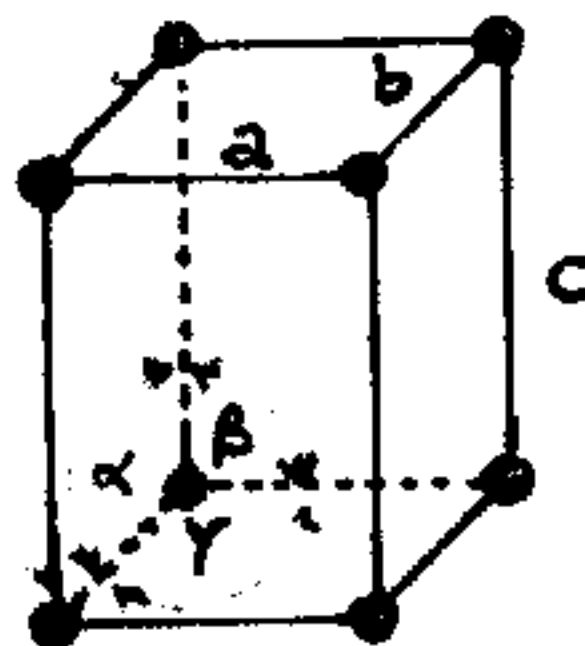
A crystal is defined as a solid with characteristic geometric shape having regular, repetitive and 3 dimensional arrangement of ions, atoms, or molecules. A crystal has a regular shape bounded by plan surfaces called faces, which intersect, at fixed angles. For example Nacl (Sodium Chloride) exist as a crystal having a cubic geometry as, shown in the figure.

$a=b=c$
$\alpha=\beta=\gamma=90°$

Simple cube.

A crystal system is defined as a geometric arrangement of a crystal unit on the basis of the length of faces(axes)along 3-co-ordinates and the angles between these axes.

Seven crystal systems have been mentioned by a French mathematician, August Bravis in 1850.These are :-

(i). **Cubic System.** All the 3 axes are of equal lengths i.e $a = b = c$
All the 3 angles are of 90^0 $\alpha = \beta = \gamma = 90^0$

Examples:- Nacl, NaBr, NaF, MgO, Fe, Cu, Diamond.

(ii). **Tetragonal system:-** Two out of 3 axes are equal in lengths, 3rd axes different , either shorter or longer i.e $a = b \neq c$.
All the 3 angles are of 90^0 i.e $\alpha = \beta = \gamma = 90^0$
Example:- SnO_2 , MnO_2, NH_4Br, $BaSO_4 . 4H_2O$

$a = b \neq c$
$\alpha = \beta = \gamma = 90^0$

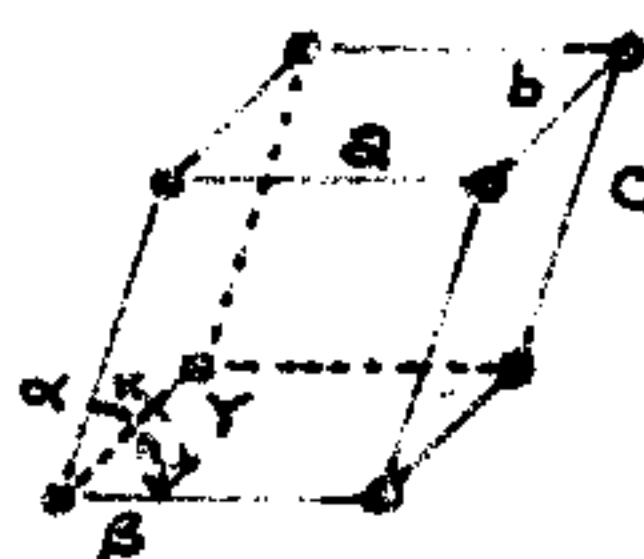
Tetragonal.

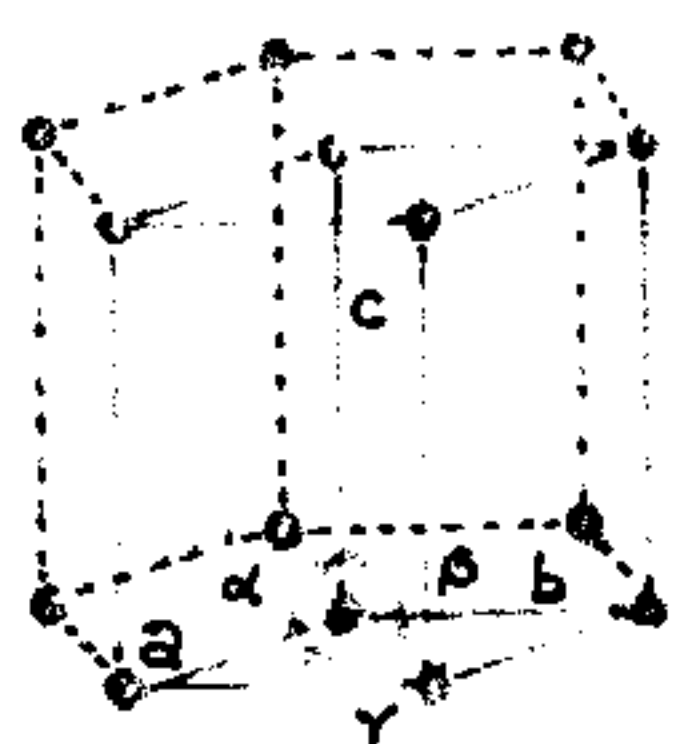
(iii) Orthorhombic or Rhombic System:-

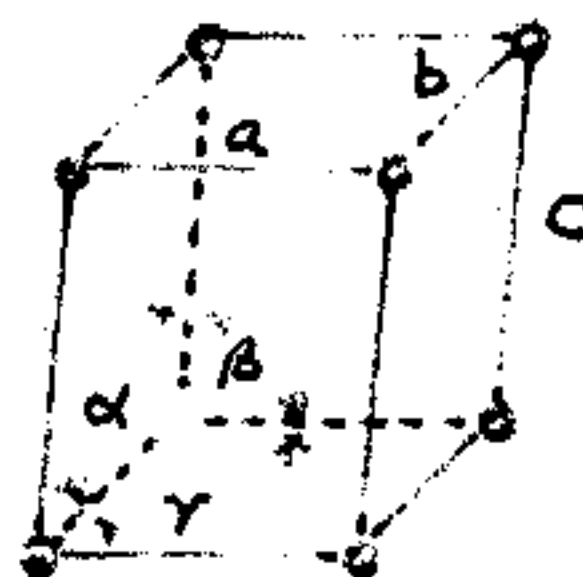
All the 3 axes are of unequal length i.e $a \neq b \neq c$
All the 3 angles are of 90^0 i.e $\alpha = \beta = \gamma = 90^0$

Example:- KNO_3, $FeSO_4 . 7H_2O$, $ZnSO_4 . 7H_2O$,
Iodine (I_2), Sulphure (S_8)

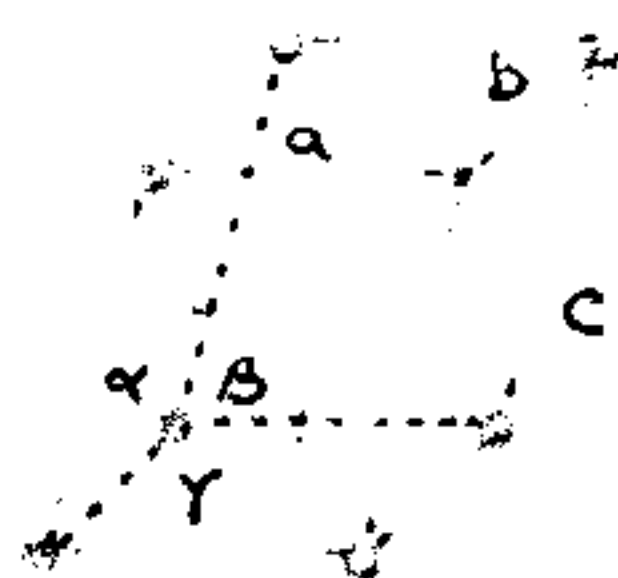
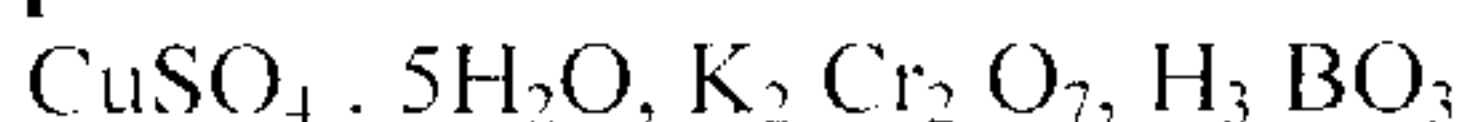
(iv.) Rhombohedral or Trigonal System:-

All the 3 axes are of equal lengths i.e $a = b = c$
All the 3 angles are unequal and lie above 90^0 and below 120^0
i.e $\alpha \neq \beta \neq \gamma$ but $90^0 >< 120^0$
Examples:- Al_2O_3, $NaNo_3$, KNO_3, Bi

5. **Hexagonal System**:- Two axes are of equal lengths while the 3rd is of unequal length $a = b \neq c$
Two angles are equal and of 90^0 while the third is of 120^0. i.e.
$\alpha = \beta = 90^0, \gamma = 120^0$

Example:- Graphite, ZnO, CdS.

6. **Monoclinic System**:-

All the 3 axes are of unequal lengths i.e $a \neq b \neq c$
Two of the 3 angles are of 90^0 while the 3rd is greater than 90^0
$\alpha = \gamma = 90^0 \; \beta \neq 90^0$ but $\beta > 90^0$
Examples:- Na_2CO_3. $10H_2O$, Sugar ($C_{12}H_{22}O_{11}$)
Na_2 B_4O_7, $10H_2O$, (Borax), Sulphur (S_8).

7. **Triclinic System:-**

All the 3 axes are of unequal lengths i.e. $a \neq b \neq c$.
All the 3 angles are unequal but should be greater than 90° and lesser than 120° i.e,
$\alpha \neq \beta \neq \gamma \neq 90^\circ$ but $90^\circ >< \mathbf{120^\circ}$

Examples:-
$CuSO_4 . 5H_2O$, $K_2 Cr_2 O_7$, $H_3 BO_3$

Methodology:-

Activity No.1(Introduction/Past Experience)

To link the present content with the previous knowledge ask the following question:-

(i) Can you define a solid?
Expected Answer:- A matter with a define shape and volume of its own.

(ii) What do you mean by definite shape and volume?
Expected Answer:- The arrangement of particles in a regular from in space.

(iii)Tell the kinds of Solids on the basis of structure?
Expected Answer:- Crystalline solids and Non-Crystalline (Amorphous) Solids.

(iv) Can anyone define a crystalline solid?

Expected Answer:- A solid which have a definite structure

(v) Who will define a crystal?

Expected Answer:- Nil.

Based upon the last question, tell the class that, today we are going to learn about the crystals and various crystal systems.

ACTIVITY NO.2 (DEFINING THE CRYSTAL)

1) Divide the class into certain groups on the basis of population.
2) Distribute various teacher made play cards showing crystal geometries.
3) Geometries on play cards will include cubic, rhombic, Monoclinic, Octahedral, Hexagonal, tetragonal crystals.

4) Ask the participants to study the drawing for five minutes.
5) Ask each group to express their ideas in points.
6) Note down these points on black board on the following pattern:-

- A definite geometric shape.
- 3-dimentional structure
- Fixed position of particles
- Various lines making angles with each other
- Particles repeated regularly.

7. Paste the teacher made chart showing cubic crystal system in front of participants.

8. From group responses make a generalization about the definition of a crystal as:- "A crystal is a solid with a particular geometric shape having

regular, repetitive and three dimensional arrangement of particles. The shape is bounded by plan surfaces which intersect at fixed angles."

9. Record this definition on black board as well as ask the participants to note it down.
10. Clarify the definition with the help of cubic crystal on the chart pasted in front of participants.

ACTIVITY NO.3 (MEANING OF CRYSTAL SYSTEM)

Here make a reference to the play cards and ask the following question:-

1.Do all the crystals are identical?

Expected Answer:- No, different crystals have different geometries.

2.Can anyone tell how different types of crystal geometries are formed?

Expected Answer:- On the basis of different lengths and angles.

3. Name different crystal types known to you.

Expected Answer:- Sulphur = Rhombic and Monoclinic.
Copper Salphate = Octahedral.
Carbon = Diamond and Graphite (Hexagonal)
Sodium Chloride = Cubic Crystals.

4. At this stage refer to the point that these different crystal types are called crystal system, and write down the definition of crystal system on board as:- " A crystal system is defined as a geometric arrangement of a crystal unit on the basis of the lengths of faces (Axes) along 3.coordinates and the angles between these axes.
5. Ask the participants to note down the definition
6. Ask the participants the following question.
   How many crystal types are there?
   Expected Answer:- Nil (Unsure)
   Here you must not declare the Number of crystal types, rather initiate another activity.

ACTIVITY NO.4 (TYPES OF CRYSTAL SYSTEM)

1. Divide the class into 7 Groups.
2. Give one play card to each group having a drawing of one crystal system with its name.
3. Three examples are written with each crystal system.

4. Each group is asked to study his play card thoroughly.
5. Ask each group leader to write the names, lengths of faces and angles on black board, one by one.
6. In total seven crystal systems will be reported.
7. Now, here, paste your own constructed chart having shapes of 7 crystal systems and co-relate the students responses with the chart for further clarity.

SUMMARY/IMPORTANT POINTS:-

At the end summarize the concepts learned today. The important points are:-

- Solids have definite shape and volumes of their own.
- Solids exist in two forms i.e. crystalline and non-crystalline or amorphous forms.
- A crystal is a solid with characteristic geometric shape having regular, repetitive and 3 dimensional arrangement of ions, atoms or molecules.
- A crystal has a regular shape bounded by plan surfaces called faces which intersect at fixed angles.
- A crystal system is a geometric arrangement of a crystal unit on the basis of the lengths of faces and angles between them.
- There are seven different crystal systems.
- The seven crystal systems include cubic, tetragonal, rhombic, trigonal, Hexagonal, Triclinic and Monoclinic. $CMHT^3$ R.

ASSESSMENT:-

Q.No.1 Define the following terms:-
(a) Crystal (b) Crystal System.

Q.No.2 Name various crystal system and give one example of each system.

Q.No.3 Draw the shapes of 7 crystal system with reference to lengths of faces and angles between them.

pH is a mathematical scale which gives the degree of Acidity or basicity of a solution in a numerical manner as we express the temperature numerically on a thermometer scale. pH is mathematically defined in terms of log of 10. Since pH is a log sclae based on power of 10, it changes by 1 unit for every power of 10 change in [H+].For example, a solution of pH = 3 has a [H+] concentration 10 times that of a solution of pH = 4 and 100 times that of solution of pH = 5.

DEFINITION:-

pH is defined as the negative logarithm to the base 10 of Hydrogen ion concentration of a solution in moles per liter. "OR" the logarithm of the reciprocal of Hydrogen ion concentrations of a solution in moles per liter.

Mathematically,

$pH = -\log_{10} [H^+]$

$pH = \log_{10} 1/[H^+]$

IMPORTANCE OF pH:-

pH is very much important in various chemical and biochemical processes. Each and every system operates in a certain pH-range. For example:-

- The pH of Blood is maintained at about 7.4. The pH of a healthy person's blood never changes by more than perhaps 0.2 pH units from the average value. Death may result if the pH falls below 6.8 or rises above 7.8.

- Similarly, the optimum pH range of a swimming pool is 7.2 to 7.6 because this range closely approximates the one in human tears. When the pH is outside this range, eye irritation can occur.

MEASUREMENT OF pH:-

pH-paper is commonly used for measuring the pH of solutions. To determine the pH of a solution more accurately, an electronic device called pH-meter is used.

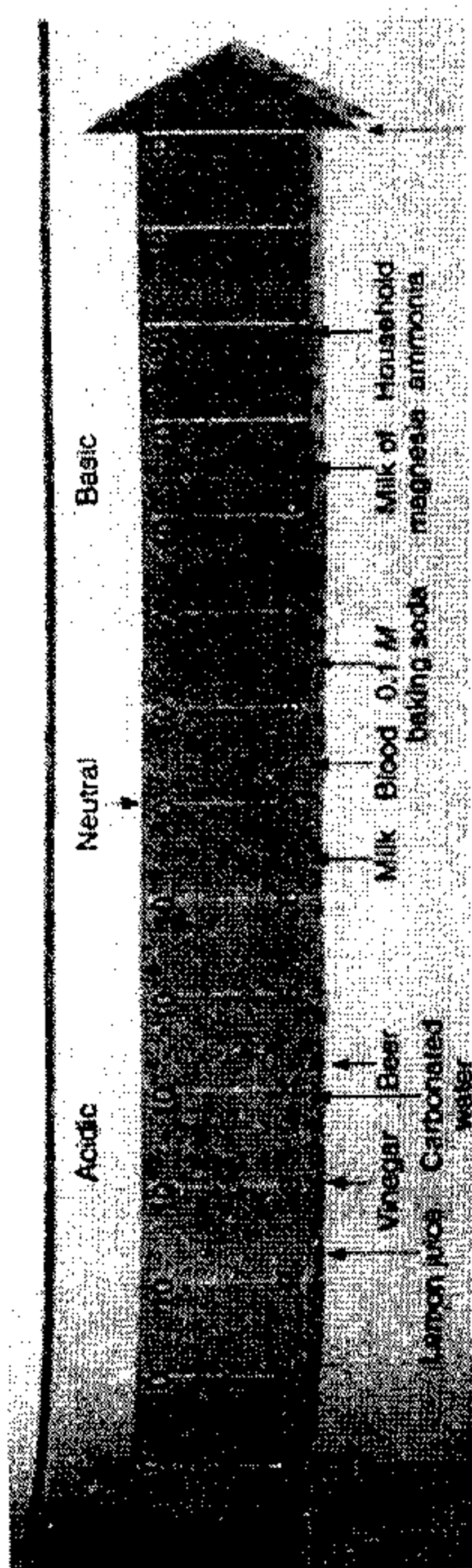
pH-RANGES:-

Although pH values are usually ranging between 1-14, but in fact these can be less than 1 & greater than 14.

An Acidic Solution has $pH < 7$ and $[H^+] > 1.0 \times 10^{-7}$ M

A Basic solution has $pH > 7$ and $[H^+] < 1.0 \times 10^{-7}$ M

A neutral solution has $pH = 7$ and $[H^+] = 1.0 \times 10^{-7}$ M

pH VALUES OF SOME COMMON SOLUTIONS AND SUBSTANCES:-

IM NaoH (14.00)
Oven Cleaner (13.8)
Sodium Hudroxide 4 % (13.0)
Hair Remover (12.8)
Washing Soda Na_2CO_3 (12.0)
House Hold Ammonia
Or Household cleaner
(11.00 to 11.5)
Milk of Magnesia (10.5)
Chlourine Bleach (9.5)
Sea water (8.1 to 10)
Baking soda $NaHCO_3$ (8.2)
Bile (7.8 to 8.6)
Fresh Egg white (7.6 to 8.0)
Blood (7.4) Tears (7.4)
Pure Water (7.0)
Milk (6.5 to 6.4)
Saliva (6.4 to 6.9)
Dates (6.2 to 6.4)
Butter (6.1 to 6.4)
Wheat Flour (5.5-6.5)
Black Coffee (5.0 to 5.5)
Urine (4.8 to 7.5)
Tomato Juice (4.2 to 4.5)
Beer (4. to 4.4)
Orange and other Fruit Juices
(3.3 to 3.5)
Soft Drinks = CO_2 + Citric
Acid (3.0 to 4.0)
Coal (3.0) Apple or Malic Acid
(3.0)
Aspirin (2.9)
Vinegar or Acctic Acid
(2.8-2.9)
Lemon Juice or Citric Acid
(2.3)
Gastric Juice or stomach Acid
(1.4 $\cong$ 1.0-2.0)
0.1 M HCl (1.0)
Battery Acid (0.8)
1M Hcl (0.0)

PROBLEMS

1.Calculate the PH value of a solution whose hydrogen ion concentration is 0.001 M

SOLUTION

PH =?
[H+] = 0.00 1m = 1/1000 = 10^{-3}
PH = –log [H+]
= – log10 [10^{-3}]

Applying the log formula

Log m^n = n log m, we have
PH = –3 X ($-\log_{10}10$)
since log10 = 1, so
PH = –3 (–1)
PH = +3

2.Calculate the PH of 1.3 x 10^{-4} M HCl solution

SOLUTION

PH = ?
[H+] = 1.3 X 10^{-4}
PH = – log [H+]
PH = –log [1.3 x 10^{-4}]
PH = – (0.1139) – (–4 log 10) Since long 10 =1
PH = – 0.1139+4
PH = 3.886

METHODOLOGY:

Activity No.1(definition of pH) : For brain storming ask the following question:-

1. Can anyone of you define an Acid?
   Expected Ans:- A substance which give hydrogen ion in water is called Acid.
2. Can you name some Acids?
   Expected Ans:- Hydrochloric Acid (Hcl), Nitric Acid (HNO_3) Sulphuric Acid ($H_2 SO_4$), Acetic Acid (Vinegar- CH_3 COOH).
3. Who will define a strong Acid?
   Expected Ans:- An Acid which completely ionizes in water.
4. What is a weak Acid?
   Expected Ans:- An Acid which partially dissociates is water.
5. How dissociation of Acids is measured?
   Expected Ans:- On the basis of Hydrogen ion concentrations.
6. Can you see Hydrogen ion concentrations in solution ?
   Expected Ans:- No
7. On what basis you classify acids as strong and weak ?
   Expected Ans:- Nil
   Confusion in students.
8. At this stage introduce the concept of pH and write on black board the following points.
   a. pH Scale invented by a Danish Biochemist Soren P.L Sorensen in 1909.

   b. It is an abbreviation for power of Hydrogen ion.

   c. It is negative logarithum to the base 10 of hydrogen ion concentration of a solution in moles per litre.

   d. Mathematically

   $$pH = -\log [H^+]$$
9. Ask the students to write down these points in their note books.

ACTIVITY NO.2 *(IMPORTANCE OF PH):-*

(i) Divide the class into 4 groups.
(ii) Distribute case study No.1 in Group I and III while case study No.2 in Group II & IV.
(iii) Case study No.1 is:-

CASE STYDY-1

Four person claiming to be patients were present at a Doctor's clinic. When the doctor inquired about their problems, all replied that they were "Diabetics" patients. The doctor conducted their blood tests. The report of first person suggested that his blood PH is exactly 7.4. Doctor declared him to be absolutely normal and healthy person. When the Doctor studied the report of 2nd person, he found the PH of his blood to be 7.6. The doctor prescribed some medicines and asked the person to take care of himself. When the doctor studied the blood reports of 3rd and 4th persons, he found their blood PH's to be 6.7 and 7.9 respectively just 0.1 unit below and above the danger zones. When the doctor saw these reports, he became worried and at once shifted the two persons to ICU ward of the Hospital Complex.

(iv)

CASE STUDY-2

Three boys were enjoying swimming in 3 different nearby swimming pools. The PH of water of 1st swimming pool was equal to that of human tears i.e. 7.3. The person after swimming was quite comfortable and fresh. The PH of water of 2nd swimming pool was 7.6. This range closely approximates the one in human tears. The person who took swimming in this pool was also fresh and comfortable. However the person who swim in the third pool was suffering from eye irritation after swimming. When the PH of water from this pool was measured, it was found to be 7.8.

(v) Ask the group to study their respective case studies for 5 Minutes.
(vi) Ask them to derive the conclusion by mutual discussion.
(vii) Monitor and ensure that the study and discussion is held in a positive way.
(viii) Ask each group to report their conclusion on black board.
(ix) Generalize the importance of PH from the conclusion of these two case studies.

ACTIVITY NO.3 (MEASURING THE PH OF SOLUTIONS AND ACID BASE RANGES).

1. Distribute to each group at least 3 solutions in separate test tubes with proper labelling. The test tube should be placed in test tube stands.
3. The solution will include 1 M Hcl, lemon juice, vinegar, 7-up, Tomato Juice, Saliva, Milk, Pure water, human tears, Baking Soda Solution, 1 M NaOH Solution, Soap Solution etc.
4. Distribute in each group 1 beaker full of water, 1 tong to help the strips of PH paper and 3 PH = paper strips
5. Ask each group to dip PH-paper turn by turn in the given solutions.
6. Instruct each group that after dipping the tong in one solution, wash it in water teken in the beaker.
7. Ask each group to note down the colour change for each solution, and record with them .
8. When all the groups have completed their work paste the PH colour chart in front of them.
9. Ask them to match their colours with the colours on the PH chart and assign PH-values to these solutions accordingly.
10. At this stage paste the teacher made chart showing PH ranges of various common house hold substances in front of students.
11. Elaborate and explain the PH values of various substances on the chart.
12. Generalize the Acidic, Basic and Neutral ranges and write down on black board as follows :-

An Acid solution has PH < 7 and [H+] > 1.0x 10-7 M

A Basic solution has PH < 7 and [H+] > 1.0x 10-7 M

A Neutral solution has PH < 7 and [H+] > 1.0x 10-7 M

12.Ask the students to write down these points in their note books.

ACTIVITY NO.4 (CALCULATE PH FROM [H+] VALUES)

1. Remind or extract the mathematical definition of PH from students.
2. Write down the mathematical formula on black board as:-
   $PH = -\log_{10}[H^+]$
3. Distribute 1 play card showing the hydrogen ion concentration $[H^+]$of solution to each group.
4. The $[H^+]$on play cards include:-

a. $[H^+]$ 0.001 M
b. $[H^+] = 0.0001$ M
c. $[H^+] = 1.3 \times 10^{-4}$ M
d. $[H^+] = 2.6 \times 10^{-3}$ M

5. Place the logarithm table in front of the students and ask them to consult it where required.
6. Ask each group to calculate PH values for each $[H^+]$.
7. Monitor and help each group where required.
8. When the group have completed their work, ask each group to present their work on black board.
9. Generalize, elaborate and make correction where required.
10. Ask the students to write down the given problems in their Note-Books.

SUMMARY/MAIN POINTS.

- PH scale was introduced by S.P.L Sorensen in 1909.
- PH is negative logarithm to the base 10 of Hydrogen ion concentration of a solution in moles per litter.
- Mathematically.
  $PH = -\log_{10}[H^+]$
- The PH of blood is maintained at about 7.4. Death may result if the PH falls below 6.8 or rises above 7.8.
- PH is measured ordinarly with the help of PH paper and more accurately by PH-meter.
- An acidic solution has PH less than 7, a basic greater than 7 and neutral solutions has PH exactly equal to 7.

SELF ASSESSEMENT:-

Q. Define PH, also write its importance in our daily life.

Q. List vinegar, tomatoes, Lemons, apples, coca cola, pure water, soil solution, soap solution, Milk and baking soda in order of increasing Acidity.

Q. Calculate the PH of each of the following solution:-

(i) 1.0×10^{-8} M H+
(ii) 7.5×10^{-3} M H+
(iii) 5.0×10^{-12} M H+
(iv) 6.3×10^{-9} M H+
(v) 0.001 M Hcl
(vi) 0.76 M HNO_3

Q. Complete the following table for a solution:-

PH	[H+]	Solution is
< 7		
	$< 1.0 \times 10^{-7}$ M	
		Neutral